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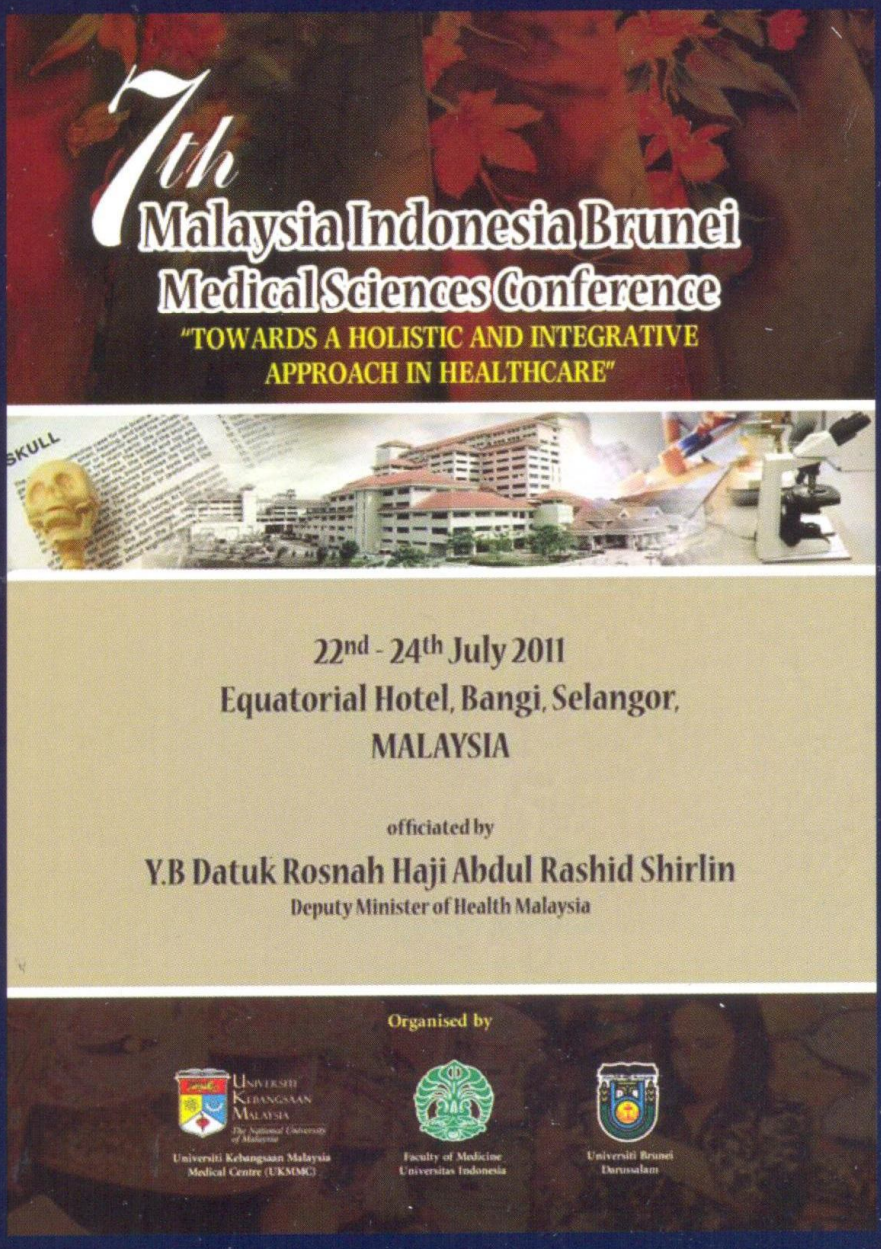

EVIDENCE OF CARTILAGE REGENERATION BY CHONDROGENIC INDUCED BONE MARROW MESENCHYMAL STEM CELLS IN A SHEEP MODEL

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Background:
Cartilage is one of the tissues in the body that lack the ability of self regeneration after injuries. There were reports that chondrogenic induced mesenchymal stem cells can regenerate damaged cartilage. In this study chondrogenic induced bone marrow stem cells (BMSC) was monitored to prove the regeneration of cartilage.

Materials & Methods:
The stem cells from the experimental sheep were expanded, labeled with PKH26 and induced to chondrocytes. Osteoarthritis was created by the complete resection of the anterior cruciate ligament and the medial meniscus following a three weeks exercise regime. The test sheep received $2x10^7$ autologous chondrogenic induced BMSCs as a five milliliters suspension, while the control received the same volume of basal medium.

Results:
Grossly, the treated knee joints showed varying degree of regenerated cartilage. Using the ICRS grading, the control scored a mean grade of 2.5, while the test group scored a mean grade of 1.5. The H&E and Safranin O showed a loosely packed matrix and mucins of the regenerating cartilage. The PKH26 fluorescence was detected on the resected pieces of the regenerated area. The 3D confocal image showed a two layered packed arrangement of the regenerated cartilage, depicting a fresh condensation of tissue.

Conclusion:
With the evidence of the PKH26 fluorescence on the resected piece of the regenerated cartilage, the regeneration capacity of the chondrogenic induced stem cells was confirmed.

Keywords:
tissue engineering, cartilage regeneration, cell tracking, stem cells